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EXAMINER

PADGETT, MARIANNE L

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 07/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/773,796

Applicant(s)

VEERASAMY ET AL.

Examiner

Marianne L. Padgett

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4/14/2006 & 6/1/2006.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-5, 7-11 and 16-40 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 3-5, (7-11), 16-17, (18), 19-20, (21-22), 23-40 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/1/06.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

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1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/14/2006 has been entered.

As noted in the advisory and in the remarks of 6/1/2006 the obviousness double patenting rejections over US PN's 6,827,977; 6,663,753; 6,764,579; 6,416,816 & 6,878,404 have been removed by showing assignment to a different assignee at the time of the invention, for these patents with later filing dates.

The terminal disclaimer (TD) for US PN 5,858,477 submitted 6/1/2006 is noted, however as of 6/24/2006 the TD had not been reviewed by a paralegal, which is required for approval, and was supposed to have been done promptly after scanning and forwarding of the TD to the electronic file. The examiner has e-mailed the appropriate clerical division to notify them of the need to review for approval the TD, but has no further control over this matter. The obviousness double patenting will be repeated below, but will be removed on receipt of approval (which the examiner assumes given discussions during the 5/9/2006 interview & remarks in the 6/1/2006 response, that approval will be received).

2. The examiner notes that the teachings of "ion impact within energy which promotes formation of sp^3 carbon-carbon bonds" relating to the claimed 15%, 35% & 70% sp^3 C-C bonds disclosed in paragraph [0015] of the specification provide support for the ion impact energy promoting the specifically claimed carbon microstructure. The following paragraph [0016] , provides support for some kind of uniformity in both the impact energy & ion weight with respect to the promoting, further stating "...the stream will be primarily composed of the ions having a uniform weight, and the impact energy will preferably be substantially uniform...this uniformity is promoted through filtering of the ions stream.... Alternately,...and extraction grid...Hydrogen and/or nitrogen may also be included, both in the ions stream

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and the protective layer". Applicant citation of [0049]; [0057-60] & [0063-64] on page 8 of the 6/1/2006 response, further tie the distributions up the ion energy in the distributions of the ion species, thus their weight distributions into the more general teachings of [0015-16], to provide support/meaning for the amendments to claim 3.

3. Claims 25-27, 29 & 31-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

New claimed 31 (and its dependent claims) contain the newly claimed limitations of "narrow ion energy distribution and a narrow ion weight distribution", but no use of "narrow" was found in the original specification, hence no disclosure of what the range implied by "narrow" encompasses was found, so that this relative term encompasses New Matter for the ranges of ion energy distribution & ion weight distribution. It is noted that paragraph [0060], in reference to the insert in figure 3F states "that the ion energy distribution of the plasma beam is quite sharp, with a width of approximately 5% about the bias voltage. The sharpness apparently arises for at least two reasons...". While "narrow" and "quite sharp" are both relative terms having potentially overlapping scopes, they are not necessarily the same scopes, and only related to the energy. Furthermore, the particular example of "a width of approximately 5% about the bias voltage", as the illustrated energy distribution Spectra, is for a particular plasma beam (which is not specified, but the examiner suspects acetylene, given its use throughout the specification), thus the particular example cannot be properly said to provide definition for narrow, nor support for ion energy distributions for all plasma beams containing carbon ions form from any material source. For these reasons you independent claims 31, its dependent claims, and possibly new claims 25, 27 & 38, appear to contain New Matter.

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Also in claim 31 (but not its dependent claim 34), the claimed subject matter appears to be broader than the scope of the enabling disclosure, as while there is extensive discussion, such as in paragraphs [0002, 5-12], of use for magnetic recording media, support for use on other "data recording substrates, as is more broadly claimed in the preamble of claim 31, which is inclusive of all sorts of data recording substrates, such as paper, etc., was not found, thus appears to encompass New Matter.

It is noted that part of the support for claims 26 & 37 may be found in paragraph number [0063], which discusses the ionic composition of a plasma beam produced using an acetylene source gas, where the mass spectra show the beams "are dominated by the $C_2H_2^+$ ion and other hydrocarbon ions having two carbon atoms, collectively referred to as the C_2 species. The next most significant ions are the C_4 species, which have been found to decrease its intensity as the pressure is lowered, being below 5% if the pressure is maintained below 5×10^{-5} mbar" (emphasis added). While there is support for a group of related dominant carbon ion species (C_2), there is not support for a single dominant carbon ion species as claimed, and the teaching provided in [0063] is ONLY directed to the use of acetylene gas. Furthermore, the claimed 5% of "non-dominant species of carbon ion", also does not appear to be directed to a single ion species, but a group thereof, i.e. C_4 , which while not defined appears from context to mean all ion species having 4 carbons, and the claim percentage is further dependent on not just the source gas used, but also the pressure range under which the plasmas formed. For these reasons there is no evidence of support for these claimed proportions for two single species of carbon ions, for either be disclosed a settling gas, or for the claimed limitation directed to all carbon containing source materials.

Claims 26 & 37 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for ion species groups of C_2 & C_4 ions produced in an acetylene gas plasma at pressures below 5×10^{-5} mb, does not reasonably provide enablement for single dominant & non-dominant carbon ion species, produced from any source material comprising carbon at any pressure. The

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specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. See above.

Claims 29 & 39, appear to encompass new matter as the claim of "a Raman G peak below about 1510 cm^{-1} ", was not found to be disclosed in the scope claimed, however paragraphs [0101-102] & table 2 have values near the higher in point of this range, with the lowest value being 1494 cm^{-1} , which is significantly above the open ended range that must be considered to go down to zero as claimed.

4. Claims 25, 27, 28, 31-35 & 38-40 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 28 & 32, it is uncertain what is meant by "subplantation", which was found used in paragraphs [0015] & [0064] in the specification, however was not defined or explained. It is noted that it is stated with respect to the C-C sp^3 bond formation, that "subplantation affect may only be significant if sufficient ions are present in the particle stream", and that considering the prefix "sub-", the literal meaning of the term appears to potentially be equivalent to -- implantation --, hence with the given context "subplantation" will be considered to be equivalent to "implantation" for purposes of examination, unless a definition stating otherwise is supplied.

Use of relative terms is vague and indefinite unless a definition defining its scope is in the claim, or in a clear definition in the specification or in provided relevant prior art. In new claim 31 the modifier "narrow" describing both the "ion energy distribution" and the "ion weight distribution" is a relative term, that was not even found in the body of the specification or original claims, hence has no clear scope.

Claims 25, 27, 35 & 38 are vague and indefinite be yet because it is unclear how "a bias voltage" relates to the claimed process, which does not require, as written, any bias voltage to be used in any part of the process or be applied to any material or thing mentioned in the independent claims, such that the width of the impact energy distribution defined by these claims is unclear, or undeterminable.

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Claims 30 & 40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

While table II & paragraph [0102] discuss a "plasmon peak", the examiner does not understand the significance/meaning of this feature as described therein with respect to be taught in claimed deposit, hence this teaching does not enable her to and evaluate the claimed meaning. As it is apparent that it has some meaning that is important to the applicants, clarification of this issue/subject is desired so that a meaningful evaluation can be made.

5. With respect to previously applied art, while Rabalais et al. (5374318) would have substantially uniform ion weight and energy distributions as claimed, this is produced by a mass selection technique that employs quadruple focusing techniques and the absence of a straight through path to eliminate various species from the beam, this uses a different technique than the claimed process, which requires a straight path, hence clarifications in the claim language have removed the 102 rejection over were Rabalais et al.

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3-5, 16-17, 20, 29-30 & 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldwin et al. (5616179), previously discussed in sections 12 & 8 of the actions mailed 3/29/2005 & 11/16/2005, respectively.

Baldwin et al. (5616179) teaches an end-Hall ion source, with a straight path from source to substrate (figures 1 & 2), the teaching therein (some cited by applicant on page 9 of their 6/1/2006 response) on col. 3, line 65-col. 4, line 12 and col. 6, lines 31- 52, indicate that most species emitted by the end-Hall ion source will traverse the distance from the source to the substrate, without making any gas phase collisions involving subsequent energy loss. While it is indicated on col. 6 that when methane gas is used, all the ion species are not carbon containing and some H^+ & H_2^+ will be produced, as seen on col. 4, lines 13-23, methane is not the only hydrocarbon contemplated for use by Baldwin et al., but alternate hydrocarbons, such as acetylene are also contemplated. From Baldwin et al. as comments it appears expected that "all the ion current was assumed to be carbon containing" for such alternatives, thus would

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inherently have a narrower & more uniform ion species distribution when using taught gases, such as acetylene. Note that Baldwin et al.'s teachings when discussing most species emitted from their ion source making it to the substrate, are including neutral species, nonionized radicals, etc., as being important to the formation of their a-C:H deposition, but note that applicants' claims while limiting parameters concerning the ions in the stream from the plasma, do not exclude the presence of these neutral species, etc., since they are not ions, but may come from a plasma. While Baldwin et al. indicates that the various neutral species are important in the formation of the deposit, the teachings also indicate that the positive ion hydrocarbon species are also important, hence they must be said to promote the formation of the a-C:H deposition. Applicants' claims do not prohibit or exclude other influences from contributing to the formation of the claimed sp³ C-C bonds, they merely require that "the substantially uniform impact energy distribution and the substantially uniform weight distributions promote formation" thereof. It would appear from the teachings of Baldwin et al. that when hydrocarbons, such as acetylene, which can be assumed to have all ion species being carbon containing, that they would correspond to a substantially uniform weight distribution as claimed in would be affecting hence promoting formation of sp³ carbon-carbon bonds.

(Note the mentioned "broad beam" irradiation cited by applicant in column 9 is an optionally supplied ion source using Ar + N₂, that is not the carbon ion source & used in an alternate mode process, hence is not relevant to the discussion.)

With respect to Baldwin et al.'s important feature of "2. The ranging energy distribution of the hydrocarbon-based positive ions in the beam.", this statement does not tell what is meant by "ranging energy distribution", hence must be read in light of the rest of the disclosure in the patent, such as col. 4, line 53 that states "the ion beam energy is about 100 eV" or col. 5, line 17-34 teaching "it is believed that when the average energy per deposition carbon atom is about 100 eV, been hard substantially optical transparent electrically resistive and non-electron-even missive a-C:H is produced. With the average

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energy per deposited carbon atom is about 50 EDP, then softer... a-C:H is produced.... one reason that V_{anode} values must be higher than expected is that there is a particular range of energy and energies produced at any given V and that there are low energy, reacted neutral species present as well...", hence it is apparent that by choosing a particular energy in a range of energies for the positive ions one produces a-C:H depositions with different hardness is, i.e. different sp^3 carbon-carbon bond percentages, where these energy distributions centered around the for example 100 eV energies for the deposited carbon atoms, i.e. impact energies, clearly are promoting the claimed bond structures and appear to be sufficiently uniform within the context claimed. Note at taught energies ion implanting mechanisms would have been expected to be involved during the coating process, especially as the thickness of the coating increased.

With respect to the specifically claimed with of the energy distribution been "approximately 5% sign of a bias voltage", it is noted that average energy is related to their V_{anode} , hence may be considered related to some sort of bias voltage, although the percentage cannot be determined from the given information, but presently as claimed applicant's limitation is not clearly related to the process, thus is not presently meaningful. With respect to the claims of "a dominant species of carbon ion and a non-dominant species of carbon ion", there will inherently be in any plasma species that have higher percentages, i.e. can be called dominant species) and those with lower percentages, and at least some/one of the carbon ion species of Baldwin at Al's plasmas, such as those employing acetylene, would be at or below 5%. Note that the "comprises" language does not limit how many dominate & non-dominant species are present, such that these claims are not considered to distinguish over Baldwin et al.

Applicants' point (page 9 of 6/1/2006 response) about Baldwin et al.'s use of hydrogen to prevent formation of graphite like carbon bonds, is not considered to effect the relevance of the Baldwin et al. reference, because applicants claims do not exclude the use of hydrogen or the effects thereof taught in Baldwin et al., particularly noting applicants' paragraph [0016], which includes the presence of hydrogen in the ion stream or the deposited coating. Furthermore, Baldwin et al. as input of hydrogen gas into the

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chamber (not into the ion source) for each use in preventing graphite like chemical bonds (col. 9, lines 53-56) is not affecting the emissions from the ion stream, hence is neither included nor excluded by applicant's claim language.

While Baldwin et al. does not teach a particular percentage of sp^3 carbon-carbon bonds in their deposits, they do teach that a-C:H deposits contain sp^3 hybridization (col. 1, lines 58-col. 2, line 17, especially 5-10), and means of using the ion energy to effect the hardness which one of ordinary skill in the art would recognize is affecting the percentage of sp^3 hybridization, therefore it would have been obvious to one of ordinary skill in the art to adjust their average ion energy in order to produce the hardness desired for the particular end use, with a higher energies that are said to produce the harder films would have had higher percentages, where routine experimentation would determine the energy to promote the desired degree of hardness/percentage of sp^3 hybridization, and thus be expected to encompass claimed values.

Note that Baldwin et al. teach that deposition rate (col. 5, lines 5-13) varies with distance between source and substrate providing examples above a deposition rate of 2000 Å/min (= 33 Å/sec) at a few centimeters distance with 500 Å /min (≈ 8.3 Å /sec).

As Baldwin et al. provide no spectra i.e. no Raman spectra, or any other spectra the examiner cannot evaluate whether or not peaks as the new claims 29-30 & 39-40 are produced, as [0102] in the specification, appears to indicate that a Raman spectra G.-peak is related to the percentage of C-C sp^3 content of the film it appears that G. peaks in the claimed range of 0-1510 cm^{-1} would d have been expected to be present due to the presence of taught sp^3 hybridization as discussed above. The plasmon peak is discussed in the same paragraph, however the examiner cannot figure out from what is written there, how it relates to anything in the deposit.

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8. Claims 19, 31-35 & 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldwin et al. as applied to claims 3-5, 16-17, 20, 29-30 & 37-38 above, and further in view of Rabalais et al. (5,374,318, previously discussed in sections 8-11 of the action mailed 3/29/2005).

While Baldwin et al. discusses desirable hard coding in optical properties of their diamondlike carbon deposits, they do not teach coating on a magnetic recording media, however the previously discussed secondary reference discusses the usefulness of such carbon deposits for optical coatings or protective coatings on magnetic recording media, etc. (column 1, lines 19-48, thus motivating the specifically claimed enduse as Rabalais et al. shows the desirability of properties as are produced in Baldwin et al. used on such substrates.

9. Lewin et al. (4486286) remains of interest for use of a remote plasma, with a weak magnetic field perpendicular to the beam direction, where the plasma is form from acetylene gas (or other hydrocarbon gases, with preferably high carbon to hydrogen ratios), and where a plasma beam is formed via the use of an anode + grid structure to apparently extract ions, but the teachings therein provide little enlightenment concerning ion energy and ion weight distributions,, however it is generally noted that higher energies increase hardness of coating.

10. Claims 3-5, 7-11, 16-22 & 31-40 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 5,858,477. Although the conflicting claims are not identical, they are not patentably distinct from each other because of reasons as set forth in section 7 of the 3/29/2005 action. As noted above, this rejection is expected to be removed shortly assuming approval of the TD that was supplied 6/1/2006, but has not been reviewed & approved by the appropriate expert.

When approval is received, claims 7-11, 18 & 21-22 will be allowable, as then all at outstanding rejections thereover will have been removed.

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11. Applicant's arguments filed 6/1/2006 and discussed above have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 25-28 & 31-40 have been considered but are moot in view of the new ground(s) of rejection.

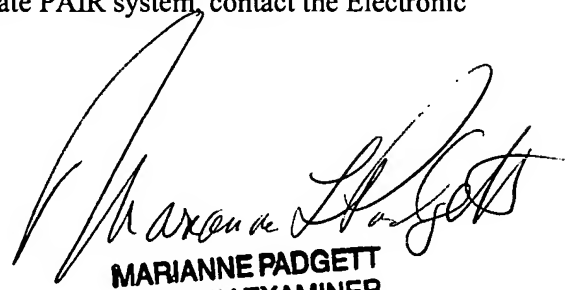
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP/dictation software

6/24/2006



MARIANNE PADGETT
PRIMARY EXAMINER